



Method of coating metal using low temperature plasma and electrodeposition

Description of Technology: This invention relates to the use of low temperature plasma technology for the corrosion protection of metals. Our novel process involves pretreatment of the metal with a plasma gas, followed by plasma deposition of a thin polymer film, and finally application of a cathodic electrocoat primer. In particular, the pretreatment step removes oxygen from the surface of the metal.

Patent Listing:

1. **US Patent No. 5,312,529**, Issued May, 17, 1994, "Method of coating metal using low temperature plasma and electrodeposition"

<http://patft.uspto.gov/netacgi/nph-Parser?Sect2=PTO1&Sect2=HITOFF&p=1&u=%2Fnetacgi%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&d=PALL&RefSrch=yes&Query=PN%2F5312529>

Market Potential: The corrosion protection of steel substrates is important for many industries, including the automotive and steel industries. Currently the most common methods of corrosion protection of steel substrates are galvanizing, application of zinc phosphate, application of primer materials by electrodeposition, conventional spray or dip priming, oil coating and combinations thereof. However, especially in the automotive industry, these methods are associated with pollution in the form of volatile organic compounds (VOC), (2) excessive waste disposal, (3) inadequate coverage of recessed areas, and (5) inadequate retention or performance of corrosion protection.

It has been discovered that improved corrosion resistance of steel or other metals can be realized by: (1) plasma pretreatment of the metal to remove oxygen and prevent further oxidation from occurring; (2) plasma deposition of a thin polymeric film; and (3) cathodic electrodeposition of an organic primer coating. Plasma treatment to remove oxygen (including oxygen in the form of oxides) may be accomplished employing a noble gas, hydrogen, nitrogen, or a mixture thereof. In particular, it was found that adhesion of the subsequent coatings was significantly improved by plasma pretreatment of the metal surface with a gas comprising hydrogen, argon, neon, helium, xenon, krypton, nitrogen, or mixtures thereof. A mixture of argon and hydrogen has been proven to be especially effective.

Benefits:

- Improved corrosion resistance of steel and other metals
- Less pollution of volatile organic compounds
- Adhesion of coatings was improved

Applications:

- Automotive and steel industries

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